1. A viscous fluid clutch comprising:

a housing including a first housing portion cast around an annular housing insert and a second housing portion connected to the first housing portion and defining a fluid reservoir contained by the first and second housing portions; and

a labyrinth seal path formed between the housing insert and the first housing portion and having a first end and a second end such that any fluid entering the labyrinth seal path is returned to the fluid reservoir between the first and second housing portions.

2. A viscous fluid clutch, comprising:

an input shaft;

a rotor assembly connected to the input shaft;

an annular housing insert;

a coil assembly operatively connected to the housing insert;

a housing including a first housing portion cast around the housing insert and a second housing portion connected for rotation with the first housing portion and rotatably disposed on the input shaft; and

a fluid reservoir disposed between the first housing portion and the second housing portion,

wherein the first housing portion and the housing insert form there between a labyrinth seal having a first end and a second end wherein each of the first end and the second end of the labyrinth path communicate with the fluid reservoir such that any fluid entering the labyrinth seal is returned to the fluid reservoir.

3. The viscous fluid clutch of claim 2, wherein the first end of the labyrinth seal is located toward an outer radial end of the rotor and the second end is located toward a central portion of the coil assembly.

4. The viscous fluid clutch of claim 2, wherein the housing insert includes an annular locking extension portion for interlocking the housing insert and the first housing portion.

5. A viscous fluid clutch comprising:

an input shaft;

a rotor assembly coupled to the input shaft;

an annular housing insert;

a housing including a first housing portion cast around the housing insert and a second housing portion connected for rotation with the first housing portion and rotatably disposed on the input shaft; and

a coil assembly including a coil body and a coil cover;

wherein the coil body is disposed between the housing insert and the coil cover; and

wherein the coil cover is coupled to the housing insert.

6. The viscous fluid clutch of claim 5, wherein the coil cover is laser welded to the housing insert.

7. The viscous fluid clutch of claim 5, further comprising at least one fastener coupling the coil cover to the housing insert.

8. The viscous fluid clutch of claim 7, wherein the fastener is a screw.

9. The viscous fluid clutch of claim 5, wherein the housing insert and the coil cover substantially conform to the shape of the coil body.

10. The viscous fluid clutch of claim 9, wherein the housing insert and the coil cover substantially encapsulate at least a portion of the coil body.

11. The viscous fluid clutch of claim 9, wherein the volume of space between the housing insert, the coil body, and the coil cover is minimized.

12. A magnetorheological fluid clutch comprising:

an input shaft;

a rotor including a radially extending hub coupled to the input shaft and an annular rotor ring coupled to the hub, the rotor ring having a radially outer surface and a radially inner surface;

a housing rotatably coupled to the input shaft, the housing including an annular slot for receiving the rotor ring, the slot having a radially outer surface proximate the radially outer surface of the rotor ring and a radially inner surface proximate the radially inner surface of the rotor ring; and

a coil assembly coupled to the housing for generating a magnetic field;

wherein at least one of the radially outer surface of the rotor ring, the radially inner surface of the rotor ring, the radially outer surface of the slot, and the radially inner surface of the slot is roughened.

13. The magnetorheological fluid clutch of claim 12, wherein the at least one of the radially outer surface of the rotor ring, the radially inner surface of the rotor ring, the radially outer surface of the slot, and the radially inner surface of the slot is has a surface roughness between approximately 8 to 12 microns.

14. The magnetorheological fluid clutch of claim 13, wherein the radially outer surface of the rotor ring, the radially inner surface of the rotor ring, the radially outer surface of the slot, and the radially inner surface of the slot art each roughened.

15. The magnetorheological fluid clutch of claim 12, wherein at least one of the radially outer surface of the rotor ring, the radially inner surface of the rotor ring, the radially outer surface of the slot, and the radially inner surface of the slot is knurled.

16. A fluid clutch for use in a vehicle comprising:

a rotor having a rotor hub coupled to an input shaft and a rotor ring having an end connected to an outer periphery of the rotor hub, the rotor ring having a radially outer edge and a radially inner edge and including:

a first portion;

a second portion; and

a grooved portion disposed between the first and second portions and including a rectangular groove extending radially inwardly from the radially outer edge of the rotor ring;

wherein the radially inner edge of the grooved portion is flush with the radially inner edge of the first portion and the radially inner edge of the second portion; and

wherein the first and second portions of the rotor each have a thickness sufficiently greater than a thickness of the grooved portion such that a magnetic flux path in the fluid clutch will have a substantial portion of a magnetic field flow around the grooved portion as compared to a portion of the magnetic field flow that flows through the grooved portion.

17. A viscous fluid clutch comprising:

an input shaft;

a rotor assembly coupled to the input shaft;

an annular housing insert;

a housing including a first housing portion cast around the housing insert and a second housing portion connected for rotation with the first housing portion and rotatably disposed on the input shaft;

a coil assembly including a coil body and a coil cover; and

a seal compressed between the coil body and the housing insert;

wherein the coil cover is coupled to the housing insert; and

wherein the coil cover contacts a portion of the coil body proximate the seal to substantially prevent the coil body from deflecting under the force applied to the coil body by the compressed seal.

18. The viscous fluid clutch of claim 17, wherein the housing insert is laser welded to the coil cover.

19. The viscous fluid clutch of claim 17, wherein one of the housing insert and the coil body includes an annular groove for receiving the seal.

20. A viscous fluid clutch comprising:

an input shaft;

a housing including a first housing portion engaged with a coil assembly and a second housing portion rotatably disposed on the input shaft, the first housing

portion including a recess defined by a first radially extending surface and a first axially extending surface, the second housing portion including an extension configured to engage the recess in the first housing portion, the extension including a second radially extending surface and a second axially extending surface, one of the first axially extending surface and the second axially extending surface including an annular groove for receiving a seal;

a seal disposed within the annular groove; and

a rotor assembly disposed between the first housing portion and the second housing portion and coupled to the input shaft;

wherein when the first housing portion is coupled to the second housing portion, the first radially extending surface makes line-to-line contact with the second radially extending surface and the seal is compressed between the first axially extending surface and the second axially extending surface.

21. The viscous fluid clutch of claim 20, wherein the first housing portion includes an annular projection that is rolled over the second housing portion to maintain the coupled condition of the first housing portion and the second housing portion.

22. The viscous fluid clutch of claim 20, wherein the volume of space between the first radially extending surface, the first axially extending surface, the second radially extending surface, and the second axially extending surface is minimized.

23. A viscous fluid clutch comprising:

an input shaft;

a rotor assembly connected to the input shaft;

an annular housing insert having a first surface coated with a Cu/Al latent exoergic coating;

a coil assembly operatively connected to the housing insert; and

a housing including a first housing portion cast around the coated housing insert and a second housing portion connected for rotation with the first housing portion and disposed on the input shaft;

wherein the latent exoergic coating on the annular housing increases the adhesion between the housing insert and the first housing portion and resists separation of the first housing portion and the housing insert.

24. The viscous fluid clutch of claim 23, wherein the Cu/Al latent exoergic coating is a 50/50 Cu/Al latent exoergic coating.

25. A bearing configured to be coupled to a housing of a fluid clutch and to an input shaft to allow the housing to rotate relative to the input shaft, the bearing comprising:

an outer race configured to be coupled to the housing;

an inner race configured to be coupled to the input shaft;

roller elements disposed between the outer race and the inner race for permitting the outer race to rotate relative to the inner race;

a first seal extending between a first side of the outer race and a first side of the inner race; and

a second seal extending between a second side of the outer race and a second side of the inner race;

wherein each of the first seal and the second seal include a substantially rigid core surrounded by a fluoroelastomer.

26. The bearing of claim 25, wherein the rigid core of the first seal is surrounded by a different fluoroelastomer than the rigid core of the second seal.

27. The bearing of claim 26, wherein the fluoroelastomer surrounding the rigid core of the first seal is configured to withstand greater temperatures and greater pressure than the fluoroelastomer surrounding the rigid core of the second seal.

28. The bearing of claim 27, wherein the first seal is configured to withstand up to at least 120 psig.

29. A viscous fluid clutch comprising:

an input shaft;

a rotor assembly coupled to the input shaft, the rotor assembly including a rotor hub and a rotor ring, the rotor hub including an axially extending portion proximate the input shaft and a radially extending portion extending radially outwardly from the axially extending portion;

a housing substantially surrounding the rotor assembly and defining a fluid reservoir, the housing including a first housing portion rotatably disposed on the input shaft and a second housing portion connected for rotation with the first housing portion, the first housing portion including an internally facing recess;

a bearing pressed into the recess of the first housing portion and coupled to the input shaft, the bearing including a first side facing the reservoir and a second side facing the opposite direction; and

a generally L-shaped seal coupled to the first housing portion so that a first leg of the seal extends radially outwardly adjacent the first side of the bearing and a second leg of the seal extends axially inwardly adjacent the axially extending portion of the rotor hub toward the radially extending portion of the rotor hub, the distal end of the second leg of the seal extending into a recess provided in the radially extending portion of the hub;

wherein the seal, the recess in the radially extending portion of the rotor hub, and the axially extending portion of the rotor hub form there between a labyrinth at least partially protecting the bearing from the fluid in the reservoir.

30. The viscous fluid clutch of claim 29, wherein the radial clearance between the second leg of the seal and the axially extending portion of the rotor hub is between approximately 0.2 millimeters and 0.6 millimeters.

31. The viscous fluid clutch of claim 30, wherein the radial clearance between the second leg of the seal and the axially extending portion of the rotor hub is approximately 0.4 millimeters.

32. The viscous fluid clutch of claim 29, wherein the axial clearance between the distal end of the second leg of the seal and the recess in the radially extending portion of the rotor hub is between approximately 0.2 millimeters and 0.6 millimeters.

33. The viscous fluid clutch of claim 32, wherein the axial clearance between the distal end of the second leg of the seal and the recess in the radially extending portion of the rotor hub is approximately 0.4 millimeters.

34. A viscous fluid clutch comprising:

an input shaft;

a rotor assembly coupled to the input shaft, the rotor assembly including a rotor hub and a rotor ring, the rotor hub including an axially extending portion proximate the input shaft and a radially extending portion extending radially outwardly from the axially extending portion, the axially extending portion including a projection extending from the end of the axially extending portion of the rotor hub;

a housing substantially surrounding the rotor assembly and defining a fluid reservoir, the housing including a first housing portion rotatably coupled to the input shaft and a second housing portion connected for rotation with the first housing portion, the first housing portion including an internally from a facing recess;

a bearing pressed into the recess of the first housing portion and coupled to the input shaft, the bearing including:

an outer race coupled within the recess of the first housing portion;

an inner race coupled to the input shaft;

roller elements disposed between the outer race and the inner race for permitting the outer race to rotate relative to the inner race;

a first seal extending between the outer race and the inner race on a first, internally facing side of the bearing; and

a second seal extending between the outer race and the inner race on a second, externally facing side of the bearing;

wherein the projection extending from the axially extending portion of the rotor hub contacts the inner race of the bearing and prevents the rotor hub from

becoming close enough to the bearing to contact the first seal or the outer race of the bearing.

35. A viscous fluid clutch comprising:

an input shaft having an axis of rotation;

a rotor assembly coupled to the input shaft, the rotor assembly including a radially extending rotor hub and an axially extending rotor ring extending from the distal end of the rotor hub;

a housing substantially surrounding the rotor assembly and including a first housing portion rotatably disposed on the input shaft and a second housing portion connected for rotation with the first housing portion;

a fluid reservoir for receiving the rotor assembly defined by the first housing portion and the second housing portion;

wherein the first housing portion includes:

a radially extending wall portion located approximately the same radial distance from the axis as the rotor ring and spanning at least the same radial distance as the rotor ring;

an angled wall portion extending radially inwardly and axially outwardly from the radially extending wall portion; and

wherein the radially extending wall portion and the angled wall portion cooperate to reduce the amount of fluid needed to fill the fluid reservoir.

36. The viscous fluid clutch of claim 35, wherein the angled wall portion extends radially inwardly and axially outwardly at an angle of between approximately 5 and 30 degrees relative to the axis of rotation of the input shaft.

37. The viscous fluid clutch of claim 36, wherein the angled wall portion extends radially inwardly and axially outwardly at an angle of approximately 26 degrees relative to the axis of rotation of the input shaft.

38. A viscous fluid clutch comprising:

an input shaft;

a rotor assembly connected to the input shaft;

an annular housing insert;

a coil assembly operatively couple to the housing insert;

a housing including a first housing portion cast around the housing insert and a second housing portion connected for rotation with the first housing portion and rotatably disposed on the input shaft; and

a brush box operatively coupled to the coil assembly;

wherein the first housing portion includes radially extending cooling fins each having a first end proximate the brush box and a second end proximate the outer periphery of the fluid clutch; and

wherein the extension of the cooling fins to the proximity of the brush box transfers heat away from the area of the clutch proximate the brush box.

39. The viscous fluid clutch of claim 38, wherein the cooling fins also extend axially away from the first housing portion.

40. The viscous fluid clutch of claim 39, wherein the cooling fins are evenly spaced around the circumference of the first housing portion.

41. A viscous fluid clutch having a back side and a front side, the viscous fluid clutch comprising:

an input shaft;

a rotor assembly coupled to the input shaft, the rotor assembly including a radially extending rotor hub and a rotor ring extending axially rearward from a distal end of the rotor hub, the rotor ring having a rear end coupled to the distal end of the rotor hub, a front end opposite the rear end, a radially outer surface, and a radially inner surface;

a housing substantially surrounding the rotor assembly and defining a fluid reservoir, the fluid reservoir including an axial slot for receiving the rotor ring, the slot having a radially outer surface proximate the radially outer surface of the rotor ring and a radially inner surface proximate the radially inner surface of the rotor ring, the housing

including a first housing portion rotatably disposed on the input shaft and a second housing portion connected for rotation with the first housing portion;

a coil assembly coupled to the second housing portion, the coil assembly including a radially extending coil cover located on the front side of the rotor hub;

wherein the radially outer surface of the rotor ring is spaced apart from the radially outer surface of the slot by a first distance and the radially inner surface of the rotor ring is spaced apart from the radially inner surface of the slot by the first distance.

42. The viscous fluid clutch of claim 41, wherein a corner between the radially outer surface of the slot and a front end of the slot is radiused.

43. The viscous fluid clutch of claim 42, wherein the radius of the corner is between approximately 1.5 and 1.9 times the first distance.

44. The viscous fluid clutch of claim 41, wherein the distance between the front end of the rotor ring and a front end of the slot is between approximately 2.0 and 2.4 times the first distance.

45. The viscous fluid clutch of claim 41, wherein the distance between the distal end of the rotor hub and a wall portion of the housing behind the distal end of the rotor hub is between approximately 3.0 and 3.4 times the first distance.

46. The viscous fluid clutch of claim 41, wherein the distance between the distal end of the rotor hub and the portion of the coil cover in front of the distal end of the rotor hub is between approximately 1.4 and 1.8 times the first distance.

47. The viscous fluid clutch of claim 41, wherein a corner between the radially outer surface of the slot and a rear end of the slot is radiused.

48. The viscous fluid clutch of claim 47, wherein the radius of the corner is between approximately 2.0 and 2.4 times the first distance.